# Activity 15. Building Bridges (STEMworks)

1. **Learning outcome(s):** (list up to 3)
   * 1. Work and communicate effectively as a team.
     2. Use scientific knowledge to design and bulid a product to specification.
     3. Deploy and enhance creativity and ingenuity to solve a problem.
2. **Relation of activity with the STEM, gender inclusiveness and Entrepreneurship:** (text, not bullets, explaining the relation of the activity to 3 above)

This activity requires teams to use skills central to entreprenuership and STEM to creatvitely and ingeniously respond to a problem with no obvious or single solution. This activity offers participants the opportunity to work in a variety of ways that facilitates inclusiveness and necessarily requires good teamwork, communication and creativity.

1. **Indicate the area of focus:**

**☒ STEM**

**☐ Gender inclusiveness**

**☒ Entrepreneurship**

1. **Materials:** (including ppts, videos, hands-on material)

* Pupil handout (information for calculations)
* A3/ poster paper for design ideas
* A4 Paper
* Tape (ideally good quality masking tape)
* String
* Test masses hand hanger
* 50cm Dowel (ca. 18mm diameter, preferably with split lengthways along 3/4 of its length) [optional]
* Hole punch [optional]
* Nuts and bolts (e.g. 45mm M4) that fit through punched holes (30 per team) [optional

1. **Preparation:**Lay out materials and provide pupil sheet.
2. **Duration:** 60 or 120 (minutes)
3. **Target group:** 12-14 (student age)

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1. **Description of the activity:**

Objective: design and construct a bridge that spans 100 cm. The first 60 minute session involves students working in teams of 5 making calculations, analysing the problem and designing a bridge design to a tight specification. There is no obvious single solution. The second hour involves construction, testing and presentation of the idea. The two hours can be run independently or combined.

0-10 mins: outline the challenge, specification, calculation requirements and materials available. It is worth demonstrating how paper can be rolled (using the dowel as a guide) and taped in position to make cylinders. Holes can be made where required in the paper cylinders using the hole punch through which nuts and bolts can be fixed.

10-45 mins: pupils make calculations and draft solutions. They must work as a team to select their best solution and should be encourage to reflect on their role within the team

45-60 mins: pupils present their proposed solution as a poster

60-100 mins: pupils construct their bridges using materials available according to their design plan.

100-120 mins: bridges are tested to destruction and pupils present their posters to class noting how their designs have evolved and how they performed. This presentation provides and opportunity to review how well the bridge met the specification and provides an opportunity for students to justify their decisions (e.g. number of lanes etc.).

**9. Link to curriculum:** Team work, communication, solving open ended problems